

Serial No. 09/966,276

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Amendments to the Claims

1. (Previously Amended) A water-based metal surface treatment composition for forming a lubricating film with excellent marring resistance comprising:

(a) a water-based urethane resin, in which the average molecular weight of the water-based urethane resin is at least 3000 and having a resin skeleton which comprises a bisphenol skeleton and at least one carboxyl group, the content of nitrogen participating in an isocyanate reaction during the synthesis of said water-based urethane resin is between 2 and 13 wt%, and the ratio of the nitrogen in urea bonds to the nitrogen participating in the isocyanate reaction, which is the proportion of nitrogen atoms pertaining to urea bonds out of the nitrogen atoms participating in the isocyanate reaction during the synthesis of said water-based urethane resin, is between 10/100 and 90/100;

(b) a hardener;

(c) silica; and

(d) a polyolefin wax,

wherein the combined amount of components (a) and (b), as solids with respect to the total solid weight (e), is 50 to 95 wt%, the equivalent ratio of functional groups in component (b) with respect to the equivalents of carboxyl groups contained in the resin skeleton of component (a) is 0.10 to 1.00, the solid weight of component (c) with respect to (e) is 3 to 40 wt%, and the solid weight of component (d) with respect to (e) is 2 to 30 wt%.

2. (Previously Amended) A water-based metal surface treatment composition as defined in Claim 1, wherein the content of nitrogen participating in an isocyanate reaction during the synthesis of the water-based urethane resin is 5 to 10 wt%.

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3. (Previously Amended) A water-based metal surface treatment composition as defined in Claim 1, wherein the hardener comprises at least one type of functional group selected from the group consisting of epoxy groups and isocyanate groups.
4. (Original) A water-based metal surface treatment composition as defined in Claim 1, wherein the amount of carboxyl groups in the water-based urethane resin is 10 to 50 calculated as the acid value for the solids of said resin.
5. (Previously Amended) A water-based metal surface treatment composition as defined in Claim 1, wherein the saponification value of the polyolefin wax is zero to 30, and the structure of the polyolefin wax is branched.
6. (Original) A water-based metal surface treatment composition as defined in Claim 1, wherein the polyolefin wax has an average particle size of 0.1 to 7.0 μm .
7. (Previously Added) A water-based metal surface treatment composition as defined in Claim 1, wherein the ratio of the nitrogen in urea bonds to the nitrogen participating in the isocyanate reaction is between 40/100 to 80/100.
8. (Previously Added) A water-based metal surface treatment composition as defined in Claim 1, wherein the equivalent ratio of functional groups in component (b) with respect to the equivalents of carboxyl groups contained in the skeleton of component (a) is 0.30 to 1.00.
9. (Previously Added) A water-based metal surface treatment composition as defined in Claim 1, wherein the combined amount of components (a) and (b), as solids with respect to the total solid weight (e), is 55 to 75%.
10. (Previously Added) A water-based metal surface treatment composition as defined in Claim 1 wherein the solid weight of component (c) with respect to (e) is 10 to 30 wt %.
11. (Previously Added) A water-based metal surface treatment composition as defined in Claim 1, wherein said silica has a particle size of 3 to 30 nm.
12. (Previously Added) A water-based metal surface treatment composition as defined in Claim 1, wherein said polyolefin wax has a melting point of 110 to 160°C.

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13. (Previously Added) A method of forming a lubricating film with excellent marring resistance on a metal surface, said method comprising:

- (a) forming a coating on said metal surface of the water-based metal surface treatment composition of Claim 1; and
- (b) drying said coating.

14. (Previously Added) The method of Claim 13 wherein said metal surface is a material selected from the group consisting of cold rolled steel sheets, galvanized steel sheets, and stainless steel sheets.

15. (Previously Added) The method of Claim 13 wherein said coating after drying has a weight of from 0.3 to 5.0 g/m².

16. (Previously Added) The method of Claim 13 wherein said metal surface is degreased prior to step (a).

17. (Previously Added) The method of Claim 13 wherein a primer film is formed on said metal surface prior to step (a).

18. (Previously Added) A lubricating film obtained by drying a coating of the water-based metal surface treatment composition of Claim 1.

19. (Currently Amended) A water-based surface treatment composition for forming a lubricating film with excellent marring resistance, comprising:

- (a) a water-based urethane resin, in which the average molecular weight of the water-based urethane resin is at least 3,000 and having a resin skeleton which comprises a bisphenol skeleton and at least one carboxyl group, the content of nitrogen participating in an isocyanate reaction during the synthesis of said water-based urethane resin is between 5 to 10 wt%, and the ratio of the nitrogen in urea bonds to the nitrogen participating in the isocyanate reaction, which is the proportion of nitrogen atoms pertaining to urea bonds out of the nitrogen atoms participating in the isocyanate reaction during synthesis of said water-based urethane resin, is between 40/100 to 80/100;
- (b) a hardener comprising at least one type of functional group selected from the group consisting of epoxy groups and isocyanate groups;

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- (c) silica having a particle size of 3 to 30 nm; and
- (d) a polyolefin wax having a branched structure, an average particle size of 0.1 to 7.0 μm and a saponification value of zero to 30;

wherein the combined amount of components (a) and (b), as solids with respect to the total solid weight (c), is 55 to 75 wt %, the equivalent ratio of functional groups in component (b) with respect to the equivalents of carboxyl groups contained in the resin skeleton of component (a) is 0.30 to 1.00, the solid weight of component (c) with respect to (e) is 10 to 30 wt %, and the solid weight of component (d) with respect to (e) is 10 to 25 wt %.

20. (Previously Added) A lubricating film obtained by drying a coating of the water-based surface treatment composition of claim 19.

21. (Previously Added) A method of forming a lubricating film with excellent marring resistance on a metal surface, said method comprising:

- (a) forming a coating on said metal surface of the water-based metal surface treatment composition of claim 19; and
- (b) drying said coating.